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EXAMINER	
ZERVIGON, RUDY	
ART UNIT	**PAPER NUMBER**
1763	

DATE MAILED: 06/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

J.C.

Office Action Summary	Application No.	Applicant(s)	
	09/775,664	SHUFFLEBOTHAM ET AL.	
	Examiner	Art Unit	
	Rudy Zervigon	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 May 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *72-93* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *72-93* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 10, 2004 has been entered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 72-74, and 76-83 are rejected under 35 U.S.C. 102(e) as being anticipated by McMillin et al (USPat. 6,013,155). McMillin teaches:

i. An inductively coupled plasma CVD processing system (Figure 7; column 6, lines 19-65) comprising: a plasma processing chamber (140; Figure 7; column 6, lines 19-65); a dielectric window (155; Figure 7; column 6, lines 19-65) forming a top wall of the processing chamber (140; Figure 7; column 6, lines 19-65); a substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18) adapted to support a substrate (120; Figure 7; column 6, lines 15-18) within the processing chamber (140; Figure 7; column 6, lines 19-65); and a plurality of injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) adapted to introduce process

gas into the processing chamber (140; Figure 7; column 6, lines 19-65), all of the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) being spaced outwardly (column 6, line 66 - column 7, lines 15-29) from the periphery of the substrate (120; Figure 7; column 6, lines 15-18) when the substrate (120; Figure 7; column 6, lines 15-18) is supported on the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18), as claimed by claim 72

ii. The system (Figure 7; column 6, lines 19-65) of claim 72, wherein the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) are provided on a first gas ring (170; Figure 7; column 6, lines 19-65); at least some of the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) include an orifice (187a; Figure 13a; column 12, line 65 - column 13, line 9) orientated relative to the axis thereof to direct the process gas in an upward direction away from the substrate (120; Figure 7; column 6, lines 15-18) when the substrate (120; Figure 7; column 6, lines 15-18) is supported on the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18); and at least some (180; Figure 12a) of the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) are orientated in the plasma processing chamber (140; Figure 7; column 6, lines 19-65) to direct the process gas along axes that intersect an exposed surface of the substrate (120; Figure 7; column 6, lines 15-18) at an acute angle (column 7, lines 26-45) when the substrate (120; Figure 7; column 6, lines 15-18) is supported on the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18), as claimed by claim 73

iii. The system (Figure 7; column 6, lines 19-65) of claim 72, wherein: the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) are provided on a first gas ring (170; Figure 7; column 6, lines 19-65); and all ("at least some" = 1 to all; column 7, lines 26-29) of the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) are orientated in the plasma processing chamber (140; Figure 7; column 6, lines 19-65) to direct the process gas along axes that intersect an exposed surface of the substrate (120; Figure 7; column 6, lines 15-18) at an acute angle (column 7, lines 26-45) when the substrate (120; Figure 7; column 6, lines 15-18) is supported on the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18), as claimed by claim 74

iv. The system (Figure 7; column 6, lines 19-65) of claim 72, wherein the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) are detachably (column 6, lines 66-67) connected to a first gas ring (170; Figure 7; column 6, lines 19-65) made of aluminum (column 6, lines 43-47) which includes outlets (holes in 170 where injectors 180 are not installed; not labeled, Figure 7) adapted to supply process gas into the plasma processing chamber (140; Figure 7; column 6, lines 19-65), as claimed by claim 76

v. The system (Figure 7; column 6, lines 19-65) of claim 76, including a second gas ring (160; Figure 7; column 6, lines 20-47) disposed above or below the first gas ring (170; Figure 7; column 6, lines 19-65) in the plasma processing chamber (140; Figure 7; column 6, lines 19-65), as claimed by claim 77

vi. The system (Figure 7; column 6, lines 19-65) of claim 72, wherein the plurality of gas flows from the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) overlap each other in a plane (plane 170; Figure 7) parallel to an exposed surface of the substrate (120; Figure 7; column 6, lines 15-18) when the substrate (120; Figure 7; column 6, lines 15-18) is supported on the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18), as claimed by claim 78

vii. The system (Figure 7; column 6, lines 19-65) of claim 72, wherein each of the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) includes an orifice (187a; Figure 13a; column 12, line 65 - column 13, line 9), and each of the orifices (187a; Figure 13a; column 12, line 65 - column 13, line 9) is spaced the same distance (column 7; lines 24-25) from substrate (120; Figure 7; column 6, lines 15-18) when the substrate (120; Figure 7; column 6, lines 15-18) is supported on the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18), as claimed by claim 79

viii. The system (Figure 7; column 6, lines 19-65) of claim 72, including a substantially planar electrically-conductive coil (150; Figure 7; column 6, lines 20-47) which inductively couples RF energy into the plasma processing chamber (140; Figure 7; column 6, lines 19-65) and energizes the process gas into a plasma state, as claimed by claim 80

ix. The system (Figure 7; column 6, lines 19-65) is claim 72, wherein all of the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) have the same length (column 7; lines 24-25) such that exit orifices (187a; Figure 13a; column 12,

line 65 - column 13, line 9) of the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) are spaced the same distance (column 7; lines 24-25) from the periphery of the substrate (120; Figure 7; column 6, lines 15-18) when the substrate (120; Figure 7; column 6, lines 15-18) is supported on the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18), as claimed by claim 81

x. The system (Figure 7; column 6, lines 19-65) of claim 72, wherein some of the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) have different lengths (column 7; lines 24-25) such that exit orifices (187a; Figure 13a; column 12, line 65 - column 13, line 9) of some of the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) are spaced a different distance from the periphery of the substrate (120; Figure 7; column 6, lines 15-18) when the substrate (120; Figure 7; column 6, lines 15-18) is supported on the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18), as claimed by claim 82

xi. The system (Figure 7; column 6, lines 19-65) of claim 72, wherein all of the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) are spaced outwardly (column 6, line 66 - column 7, lines 15-29) from the periphery of the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18), as claimed by claim 83

Claim Rejections - 35 USC § 103

4. Claim 75 is rejected under 35 U.S.C. 103(a) as being obvious over McMillin et al (USPat. 6,013,155).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(l)(1) and § 706.02(l)(2).

McMillin is discussed above. McMillin does not teach that all of the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) are orientated to direct the process gas in an upward direction away from an exposed surface of the substrate (120; Figure 7; column 6, lines 15-18) when the substrate (120; Figure 7; column 6, lines 15-18) is supported on the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have all of McMillin's injector tubes direct the process gas in an upward direction away from an exposed surface of the substrate.

Motivation to have all of McMillin's injector tubes direct the process gas in an upward direction away from an exposed surface of the substrate is for influencing local deposition rates as taught by McMillin (column 8, lines 62-65).

5. Claims 84-93 are rejected under 35 U.S.C. 103(a) as being obvious over McMillin et al (USPat. 6,013,155) in view of Chen, Aihua (USPat. 5,691,876). McMillin is discussed above. McMillin further teaches:

i. An inductively coupled plasma CVD processing system (Figure 7; column 6, lines 19-65), comprising: a plasma processing chamber (140; Figure 7; column 6, lines 19-65); a dielectric window (155; Figure 7; column 6, lines 19-65) forming a top wall of the plasma processing chamber (140; Figure 7; column 6, lines 19-65); a substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18) adapted to support a substrate (120; Figure 7; column 6, lines 15-18) within the processing chamber (140; Figure 7; column 6, lines 19-65), a plurality of injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) each including an orifice (187a; Figure 13a; column 12, line 65 - column 13, line 9) oriented relative to the axis thereof to direct the process gas in an upward direction away from the substrate (120; Figure 7; column 6, lines 15-18) when the substrate (120; Figure 7; column 6, lines 15-18) is supported on the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18); and/or (ii) a plurality of injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) each oriented in the plasma processing chamber (140; Figure 7; column 6, lines 19-65) to direct the process gas along an axis thereof that intersects an exposed surface of the substrate (120; Figure 7; column 6, lines 15-18) at an acute angle (column 7, lines 26-45) when the substrate (120; Figure 7; column 6, lines 15-18) is supported on the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18) - claim 85

ii. The system (Figure 7; column 6, lines 19-65) of Claim 85, wherein the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) are detachably (column 6, lines 66-67) connected to a first gas ring (170; Figure 7; column 6,

lines 19-65), the first gas ring (170; Figure 7; column 6, lines 19-65) includes outlets (holes in 170 where injectors 180 are not installed; not labeled, Figure 7) through which process gas is supplied into the plasma processing chamber (140; Figure 7; column 6, lines 19-65), and further including a second gas ring (160; Figure 7; column 6, lines 20-47) disposed above or below the first gas ring (170; Figure 7; column 6, lines 19-65), as claimed by claim 88

iii. The system (Figure 7; column 6, lines 19-65) of Claim 85, wherein the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) are oriented in the plasma processing chamber (140; Figure 7; column 6, lines 19-65) to direct the process gas along axes that intersect the exposed surface of the substrate (120; Figure 7; column 6, lines 15-18) at an acute angle (column 7, lines 26-45) when the substrate (120; Figure 7; column 6, lines 15-18) is supported on the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18), as claimed by claim 89

iv. The system (Figure 7; column 6, lines 19-65) of Claim 85, wherein the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) include an orifice (187a; Figure 13a; column 12, line 65 - column 13, line 9) oriented relative to the axis thereof to direct the process gas in an upward direction away from an exposed surface of the substrate (120; Figure 7; column 6, lines 15-18) when the substrate (120; Figure 7; column 6, lines 15-18) is supported on the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18), as claimed by claim 90

v. The system (Figure 7; column 6, lines 19-65) of Claim 85, wherein a plurality of gas flows from the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 -

column 7, line 18) overlap each other in a plane parallel to an exposed surface of the substrate (120; Figure 7; column 6, lines 15-18) when the substrate (120; Figure 7; column 6, lines 15-18) is supported on the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18), as claimed by claim 91

vi. The system (Figure 7; column 6, lines 19-65) of Claim 85, including a substantially planar electrically-conductive coil (150; Figure 7; column 6, lines 20-47) which inductively couples RF energy into the plasma processing chamber (140; Figure 7; column 6, lines 19-65) and energizes the process gas into a plasma state, as claimed by claim 92

vii. The system (Figure 7; column 6, lines 19-65) of Claim 85, wherein each of the injector tubes (180, 180a, 180b; Figure 12a,b, 13a,b; column 6, line 66 - column 7, line 18) has the same length (column 7; lines 24-25), as claimed by claim 93

McMillin does not teach:

viii. the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18) including means for maintaining the substrate (120; Figure 7; column 6, lines 15-18) at a desired temperature – claim 85

ix. The system (Figure 7; column 6, lines 19-65) of claim 72, wherein the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18) includes means for maintaining the substrate (120; Figure 7; column 6, lines 15-18) at a desired temperature when the substrate (120; Figure 7; column 6, lines 15-18) is supported on the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18), as claimed by claim 84

x. The system (Figure 7; column 6, lines 19-65) of Claim 85, wherein the means for maintaining the substrate (120; Figure 7; column 6, lines 15-18) at a desired temperature includes an electrostatic chuck and is adapted to maintain the substrate (120; Figure 7; column 6, lines 15-18) at a temperature ranging from about 325°C to 375°C when the substrate (120; Figure 7; column 6, lines 15-18) is supported on the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18), as claimed by claim 86

xi. The system (Figure 7; column 6, lines 19-65) of Claim 85, wherein the substrate (120; Figure 7; column 6, lines 15-18) support (130; Figure 7; column 6, lines 13-18) includes a heat transfer gas source which is adapted to supply a heat transfer gas to control the temperature of the substrate (120; Figure 7; column 6, lines 15-18) to a temperature of about 100°C to 400°C, as claimed by claim 87

Chen teaches:

xii. the substrate (not shown; Figure 1; column 8, lines 40-55) support (100; Figure 1) including means for maintaining the substrate (not shown; Figure 1; column 8, lines 40-55) at a desired temperature – claim 85

Applicant's means for maintaining the substrate at a desired temperature is supported by the specification:

" [0027] In order to prevent damage to metal lines or the pre-existing films and structures on the substrate and to ensure accurate and precise process control, a heated mechanical or preferably an electrostatic chuck (ESC) is employed to hold the substrate. The ESC is preferably bipolar or

monopolar. Preferably, the electrode is maintained at a temperature ranging from about 50°C. to 350°C, in order to maintain the temperature of the wafer to about 325°C to 375°C.

"

Consequently, Chen teaches equivalent means (column 6, lines 35-54; 5-18)

xiii. The system (Figure 1) of claim 72, wherein the substrate (not shown; Figure 1; column 8, lines 40-55) support (100; Figure 1) includes means (see above) for maintaining the substrate (not shown; Figure 1; column 8, lines 40-55) at a desired temperature when the substrate (not shown; Figure 1; column 8, lines 40-55) is supported on the substrate (not shown; Figure 1; column 8, lines 40-55) support (100; Figure 1), as claimed by claim 84

xiv. The system (Figure 1) of Claim 85, wherein the means for maintaining the substrate (not shown; Figure 1; column 8, lines 40-55) at a desired temperature includes an electrostatic chuck and is adapted to maintain the substrate (not shown; Figure 1; column 8, lines 40-55) at a temperature ranging from about 325°C to 375°C (claim 9) when the substrate (not shown; Figure 1; column 8, lines 40-55) is supported on the substrate (not shown; Figure 1; column 8, lines 40-55) support (100; Figure 1), as claimed by claim 86

xv. The system (Figure 7; column 6, lines 19-65) of Claim 85, wherein the substrate (not shown; Figure 1; column 8, lines 40-55) support (100; Figure 1) includes a heat transfer gas source (column 6, lines 5-18) which is adapted to supply a heat transfer gas to control the temperature of the substrate (not shown; Figure 1; column 8, lines 40-55) to a temperature of about 100°C to 400°C (claim 9), as claimed by claim 87

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace McMillin's support (130; Figure 7; column 6, lines 13-18) with Chen's temperature controlled support (100; Figure 1).

Motivation to replace McMillin's support (130; Figure 7; column 6, lines 13-18) with Chen's temperature controlled support (100; Figure 1) is for conducting high temperature processing of substrates as taught by Chen (column 1; lines 1-18; column 2; lines 18-24).

Response to Arguments

6. Applicant's arguments with respect to claims 72-93 have been considered but are moot in view of the new grounds of rejection as necessitated by Applicant's newly submitted claims 72-93.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272.1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (703) 872-9306. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Gregory L. Mills, at (571) 272-1439.

Rudy Zervigon
6/24/04